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AN ACCOUNT OF SOME EXPERIMENTS ON MERCURY,

MADE AT GUILDFORD IN MAY, 1782.

IN THE LABORATORY OF

J. PRICE, M. D. F. R. S.

THE SECOND EDITION.

Eſt quodam prodire tenus ſi non datur ultra. HOR.

WE may among other things learn from it this leſſon, that we ought not to be ſo forward as many men otherwiſe of great parts are wont to be, in preſcribing narrow limits to the power of Nature and Art, and in condemning and deriding all thoſe that pretend to, or believe, uncommon things in Chymiſtry, as either Cheats or Credulous. Boyle.

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ADVERTISEMENT.

THE Author of the following account intends to publiſh an appendix, in which he will attempt to explain the principles of ſome of his proceſſes, and to ſhew their analogy to experiments related by Chemiſts of reputation:—as the collecting theſe muſt require ſome reading and attention, he cannot aſſign preciſely the time at which the appendix will appear, but it will be prepared with all convenient expedition.

Boyle's narrative, which was prefixed to the former Edition, and ſome references to other writers, will be more properly inſerted in the appendix, and are therefore at preſent omitted.

The Author avails himſelf of this opportunity to obſerve, that the reports circulated reſpecting a miſtake in theſe proceſſes from employing Mercury accidentally impregnated with Gold by having been uſed in the manufacture of Or molu, &c. are entirely without foundation; as indeed is evident from Exp. IV and V, and Exp. VII p. 26. l. 5. (1ſt Edit.)

He has not on inquiry found any reaſon to believe that the Mercury employed in theſe Experiments had in it more precious Metal than is uſually contained in all Mercury: and indeed the notion of manufacturers ſuffering Mercury ſo richly impregnated to paſs out of their hands, without extracting all the Gold ſeparable by the common methods, is ſo very improbable as ſcarcely to require refutation.

He alſo begs leave to remark, that the Gentlemen who in ſome of the public prints repreſented his late degree as confer'd in conſequence of theſe experiments, muſt have been miſinformed. There was not the leaſt connection between them, as is well known to almoſt every member of the Convocation; nor indeed could there be, ſince the degree was given ſome time before *theſe experiments were known in* Oxford. *It was conferred expreſly on account of his* former *chemical labours; in a manner indeed ſo honourable, that he thought it but decent to ſhew his grateful ſenſe of it in the introduction to his pamphlet.*

He is unwilling to trouble the Public with ſo much about a trifling individual; but he truſts to their candor for his excuſe, ſince the reports alluded to ſeemed to require that ſome notice ſhould be taken of them.

Many other remarks which he has heard might be removed by an attentive peruſal of the narrative. He has only to add, that he is ſorry his account, to which he himſelf gave only the unaſſuming title of "Experiments on Mercury," ſhould have been held out to the world as announcing the diſcovery of the Philoſopher's Stone, which in the uſual *ſenſe of the word, he perhaps as well as others, thinks merely chimerical.*

INTRODUCTION.

THE Experiments which it is the purpoſe of the enſuing narration to relate being ſuppoſed to tend to the eſtabliſhment of opinions not generally received, and being alſo in themſelves of an uncommon nature, it may be requiſite to lay before the Reader the reaſons which induced the Author to engage in them, and the teſtimony on which their credit reſts.

Many analogies between the habitudes of Mercury, Gold and Silver, to chemical ſolvents and other agents have been remarked by every writer on Chemiſtry, and were too obvious to eſcape the attention of the Author in a courſe of Experiments, in which an ardent curioſity engaged him at a very early period, and which in conſequence of his attachment to the metallurgic branches of Chemiſtry—his being partly engaged in inſtructing others, and from various cauſes not neceſſary to mention, he had occaſion to compare with paſſages in ancient chemical writers.

The coincidence between the reſult of his experiments, and the facts related by theſe writers, induced

him

him (without agreeing with them in their ſpeculative notions) to believe that a degree of credit was due to their accounts; which, though frequently exaggerated, ſeemed to have at leaſt ſome foundation.

This opinion was ſtrengthen'd by a peruſal of the proceſſes of more modern Chemiſts, and confirmed by the obſervation of many phænomena too obvious to require, or too trivial to deſerve remark on this occaſion.

To real Chemiſts it would be unneceſſary to hint at theſe analogies; to others it would be uſeleſs: to the former many will readily occur; to the latter an alluſion to chemical facts or complicated reaſonings founded on them would be unintelligible: for theſe reaſons therefore added to thoſe contained in the advertiſement, the Author paſſes over the cauſe of inſtituting his enquiry, and proceeds to the atteſtation of its reſult.

That which is to be atteſted is ſimply a narrative of facts; and of *facts* all men of common ſenſe are equally judges.

Thoſe who may urge the impropriety of attempting to prove a chemical fact by any but chemical witneſſes, ſhould reflect on the difficulty of deceiving men even of common ſagacity as to occurences which paſs before their own eyes;—the ſenſes of touch and ſight are ſurely not confined to Chemiſts.

It is not however neceſſary to dwell on this; for the teſtimony at preſent offer'd poſſeſſes peculiar advantages.

The Characters of many Spectators of theſe proceſſes, whoſe Titles adorn the following pages, are too well known in the political or literary world, to require in this place any illuſtration.

Among the remainder, ſome,—members of a Society, whoſe object is to inveſtigate truth by experiment, were too perſpicacious to let error eſcape undetected: and the ſacred function of others muſt have impelled them to mark it, if voluntary, with public reprobation.

In the firſt Experiment, indeed, the Author had only time to requeſt the preſence of Captain Groſe, a gentleman advantageouſly known to the Antiquarian world by his reſearches and publications; that of the Rev. Mr. Anderſon, a Clergyman reſiding near Guildford, well verſed in Experimental Philoſophy, and ſtudious of its Chemical branches; and of Mr. Ruſſell a Magiſtrate of the Place, and a perſon from his technical employments converſant with the appearance of the precious metals, well acquainted with the uſual operations on them, and with the methods employed by Artiſts for aſcertaining their commercial value.

As the firſt proceſs was quickly mentioned, more ſpectators were preſent at the later ones; and the ſeventh was made before a company ſo reſpectable, as to leave the author little to wiſh for in point of teſtimony.

The place in which theſe Experiments were made being at a conſiderable diſtance from the Capital, would not admit of their being ſeen by many to whom the Author would otherwiſe have been happy in exhibiting them.

The whole of the materials producing the extraordinary effect, was expended in performing the proceſſes which are now to be related; nor can the Author furniſh with a ſecond portion, but by a proceſs equally tedious and operoſe, whoſe effects he has recently experienced to be injurious to his health, and of which he muſt therefore avoid the repetition.—The repetition indeed would avail but little to eſtabliſh the facts, or gain belief. That more would believe if more had been preſent, may indeed be true; but as the ſpectators of a fact muſt always be leſs numerous than thoſe who hear it related, the majority muſt at laſt believe, if they believe at all, on the credit of atteſtation.

Previous to this publication the Author has had frequent opportunities of hearing the opinions of many concerning its ſubject. Some ſay that they cannot

not aſſign the Theory of the proceſs, and *therefore* that the fact is not true. Others aſk if it be true is it profitable? Illiberal minds ſuggeſt that the whole was a trick, and without knowing or *enquiring* what evidence it reſts on, modeſtly call the Author a knave and the Spectators fools: — And ſome Heroes of incredulity, declare that they would not believe it though they ſaw it with their own eyes and touched it with their own hands.

To prejudice, avarice, or illiberality, perhaps no anſwer will prove ſatisfactory: But of the candid and impartial he ventures to aſk, by what arts of deceit Mercury can be prevented from boiling in a red heat: as in Exper. II. or when actually boiling and evaporating, it could be almoſt inſtantaneoſly checked by addition of a ſubſtance not above 1.480th. of its weight as in Exper. III.

Metal might (though not eaſily before twelve or fourteen Spectators) have been ſecretly conveyed into the crucible, but this will not account for the event of Exper. IV. and V. where the Silver was enriched with a quantity of Gold eight times larger than the weight of powder projected, and yet the abſolute gravity of the mixed maſs remained the ſame, or rather ſmaller, than the original weight; which could not have happened had any undue addition been made. He may further aſk (though this is not properly an argument which the Public at large, but only with thoſe who know his ſituation) what could induce him to take ſuch laborious and indirect methods of acquiring ſiniſter fame: poſſeſſed as he was of total independence, and chemical reputation.

The Author is too well aware of the ſtrength of prejudice to be at all ſanguine in his expectations of receiving credit; but the curioſity of the public has been ſo much excited, and his character ſo rigorouſly examined, that in juſtice to himſelf and compliance with them, he offers the following ſuccinct account of his Experiments. An account which was read over to the reſpective witneſſes of each experiment, and of which he now publickly, as before privately, requeſts their confirmation, without any fear of contradiction, or diſſent.

He has endeavoured to give every poſſible ſanction to his proceſſes, by ſubjecting them to the minute inſpection and cautious examination of the ſpectators; whoſe rank and diſcernment confer as much honour on him, as is reflected on themſelves by their liberality and candour.

Whatever may be the opinion of the Publick, it is previouſly neceſſary that they ſhould have the facts laid before them. And though he would be moſt happy to meet with belief, he ſhall not be ſurprized if he fails of obtaining it.

With confidence therefore in his own integrity and reliance on their candour he waits their deciſion, not void of ſolicitude, but without trepidation: the more confirmed by the recent honours with which the Univerſity to whom he owes his Education has crowned his Chemical labours.

Her favours he thus publickly mentions, from a better motive he hopes than vanity: by them his ſcientific and moral character is placed beyond the limits, at leaſt of vulgar ſcrutiny: and he muſt ever remember with reſpectful gratitude, that ſhe enlarged her inſtitutions, to place him among her Graduates, at the inſtance of her Medical Profeſſors and with the approbation of the Academic Senate.

EXPERIMENTS

ON

MERCURY AND SILVER.

EXPERIMENT I.

Made May the 6th, 1782. before the Rev. Mr. Anderſon; Capt. Francis Groſe; Mr. Ruſſell and Mr. D. Groſe, the Gentlemen mentioned in the Introduction as the moſt proper witneſſes of the proceſs, then reſident in Guildford.

HALF an ounce of Mercury provided by Capt. Groſe (bought at an apothecary's of the town) was placed in a ſmall heſſian crucible, brought by Mr. Ruſſell on a flux compoſed of Borax, (alſo brought by him) a ſmall piece of charcoal, taken out of a ſcuttle (fortuitiouſly) by Mr. D. Groſe, and examined by the reſt of the company; and a ſmall piece of Nitre alſo taken out without ſelection, by the Rev. Mr Anderſon, from a quantity in common uſe, in the Laboratory; theſe being pounded together in a mortar which all the company had previouſly inſpected, were preſſed down into the crucible with a ſmall peſtle: on this flux the Mercury was poured by Mr. Anderſon, and upon it half a Grain, carefully weighed out by Mr Ruſſell, of a certain powder of a deep red colour, furniſhed by Dr. P. was put on it by Mr. Anderſon.

The crucible was then placed in a fire of a moderate red heat by Dr. P. who from his greater facility in managing the fire from long habit, was thought moſt elegible to conduct the experiment. He repeatedly called the attention of the company to obſerve the ſtages of the proceſs, and to remark in every part of it that any voluntary deception on his part was impoſſible.

In about a quarter of an hour, from the projection of the powder, and the placing of the crucible in the fire, he obſerved to the Company, who on inſpection found his obſervation true, that the Mercury, though in a red hot crucible, ſhewed no ſigns of evaporation, or even of boiling: the fire was then gradually raiſed, with attention on the part of the company, and repeated calls for that attention from Dr. P. that no undue addition might be made to the matter in the crucible; in a ſtrong glowing red, or rather white-red, a ſmall dip was taken on the point of a clean Iron Rod, and when cold, the *ſcoriæ* ſo taken being knocked off, were ſhewn to the company and found replete with ſmall globules of a whitiſh coloured metal, which Dr. P. obſerved to them could not be Mercury as being evidently fixed in that ſtrong heat: but as he repreſented to them *might be* an intermediate ſubſtance between Mercury and a more perfect metal.

A ſmall quantity of Borax (brought by Mr. R.) was then injected by him and the fire raiſed, but with the ſame precautions on the part of Dr. P. to ſubject every thing to the minute inſpection of the perſons preſent; and after continuing the crucibles in a ſtrong red-white heat for about a quarter of an hour it was carefully taken out, and gradually cooled: on breaking it, a globule of yellow metal was found at bottom, and in the ſcoriæ ſmaller ones, which collected and placed in an accurate ballance by Mr. Ruſſell, were found to weigh *fully* Ten Grains. This metal was in the preſence of the above mentioned Gentlemen ſealed up in a phial, impreſſed with the Seal of Mr. Anderſon, to be ſubmitted to future examination, though every one preſent was perſuaded that the metal was gold.

The ſeal being broke the next morning, in the preſence of the former company, and of Captain Auſten, and the metal hydroſtatically examined, the weight of the larger globule (the others being too minute for this mode of examination) was found to be in air 9 Grains and a Quarter, and in diſtilled water of temp. Fahren. 50 plus, it loſt, ſomething more than $\frac{3}{8}$ (but not quite an half) of a grain: the difference was not appreciable, as no ſmaller weight than the eighth of a grain was at hand, but was judged by all the company to be nearly intermediate; i. e. $\frac{7}{16}$:—at half a grain the ſp. gr. would be rather more than 18:1; if only $\frac{3}{8}$ were loſt in water the ſp. gr. would exceed 24:1. the intermediate, would be 21.$\frac{1}{7}$ nearly; but as the loſs ſeemed rather more than the intermediate, though apparently and decided leſs than half a grain, the ſpecific gravity muſt have been nearly as 20:1. and in this eſtimate all preſent acquieſced.

After this hydroſtatical examination, the globule was flattened by percuſſion into a thin plate, and examined by Mr. Ruſſell in the manner of artiſts for commercial purpoſes; on finiſhing his ſcrutiny he declared it to be as good gold as the grain gold of the *refiners*, and that he would readily purchaſe ſuch gold as that which he had juſt examined at the higheſt price demanded for the pureſt gold.

The plate being then divided, one half was before the company ſealed up by Mr. A. to be ſubmitted to a trial of its purity, which Dr. P. propoſed, requeſting his friend, Dr. Higgins, of Greek Street, to make; the remainder being put into Aq. Regia of of Nit. acid and Sal. Ammon. afforded a ſolution ſufficiently rich, before the company ſeparated, to yeild with ſol. of Tin, a richly coloured crimſon precipitate.

Capt. G. was accidentally abſent when the precipitate was made, but ſaw it next day. In about four hours the portion of metal employed was completely diſſolved, and the next morning before Capt. and Mr D. Groſe, and Mr Ruſſell (Mr. A. being prevented from coming) the ſolution being divided into three portions the following experiments were made *.

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* The ſmall plate falling by accident on a globule of Mercury on the table readily amalgamated with it. This is mentioned in conſequence of an obſervation in the Critical Review. The Smiris Hiſpanica is not in the leaſt employed in the Preparation injected on the Mercury.

The Proceſs is more analogous to that of Dr. Brandt, referred to by the ingenious Reviewer of this article, in his very candid and ſatisfactory Critique.

To the firſt portion, diluted with water, was added a quantity of Cauſtic Vol. Alk. and the precipitate, which was copious, being duly ſeparated and dried, about a grain of it, placed on a tin plate, was heated and found to explode ſmartly. This experiment was repeated three times.

To the ſecond portion, diluted, was added a portion of Sol. of Tin, in Aq. Reg. A beautiful crimſon coloured precipitate was immediately formed in conſiderable quantity; which when dried, was mixed with a fuſible frit, compoſed of flint-powder, and the fluxes proper for the Ruby Glaſs of Caſſius, in the proportion of 5 Grains of the precipitate to ʒij of the frit, and in a vitrifying heat afforded in about three hours a tranſparent glaſs, which by heating again, aſſumed an elegant crimſon colour: and the remainder which continued in the fire alſo acquired a bright red colour.

The third portion being mixed with Vitriolic Ether, imparted to it the yellow colour given to this fluid by ſolutions of Gold: and the Ether being evaporated in a ſhallow veſſel, a thin purpliſh pellicle adhered to the ſide, ſpotted in ſeveral places with yellow.

Dr. Higgins ſoon after receiving the piece of Metal, favoured the Author with an anſwer, in which he notified that the packet came to him under the proper ſeal:—That he was well ſatisfied of the *purity* of the gold he received; and that he conſidered the author's experiments as excluſively ſufficient to have aſcertained the nature and purity of the metal.

EXPERIMENT II.

Made at Dr. Price's, May 8th, 1782, before Sir Philip Clarke, Dr. Spence, the Rev. Mr. Anderſon, Capt. Groſe, Mr. Ruſſel, and Mr. D. Groſe.

HALF an ounce of Mercury, procured from one Mr. Cunningham an Apothecary of the town, was placed on a flux compoſed of an ounce of powdered Charcoal, two drachms of Borax, and one ſcruple of Nitre, and on it when a little warmed was projected one grain of a white powder, furniſhed by Dr. Price.

After the Crucible had acquired a red heat, the Company all ſaw the Mercury lying quiet at the bottom, without boiling or ſmoking in the leaſt, and it continued in this tranquil ſtate after it had gained a full red heat. It was continued in a fire gradually augmented to a white heat, near three quarters of an hour, a ſmaller crucible *previouſly inſpected*, being inverted on it, to prevent coals from falling in: and the crucible being then withdrawn and cooled, many globules of white metal were found diffuſed through the whole maſs of ſcoriæ: of theſe globules were collected to the weight of ten grains, before the company ſeparated, and conſigned to the care of Mr. Ruſſel, who took them away with him.

Part of the remaining globules being afterwards collected, by pounding the crucible and waſhing over the powder, the whole when melted together amounted to thirteen grains.

Dr. Price remarked on this proceſs, that having taken too great a quantity of Charcoal, the globules were thereby diſperſed over the whole maſs, and the powder having been ſprinkled againſt the ſides of the crucible had not produced its greateſt effect. And that ſome of the Mercury which had eſcaped its action muſt have been volatilized by the heat; and this on inſpection of the covering crucible was found to be true. The Experiment was therefore the next morning repeated in preſence of Mr. Anderſon, Capt. and Enſign Groſe and Mr. Ruſſel.

EXPERIMENT III.

THE remaining half ounce of Mercury was employed; the charcoal and borax both taken without ſelection from large quantities in the laboratory, were powdered by Mr. Groſe, and the Mercury placed in the crucible as in the former Experiment.

Barely half a grain of the White powder, weighed out by Mr. Ruſſel, was projected on the Mercury, which by ſome accidental delay had begun to boil in the Crucible; but on the application of the powder the ebullition ceaſed, although the crucible and contained Mercury was ſubjected to a *much greater* heat; and it continued without boiling, even when of a red heat. The crucible was gradually heated to a *white* heat, and when cooled and broke, there was found in the bottom a well collected bead of fine white metal, weighing four grains.

EXPERIMENT IV.

ON the ſame day, and the ſame perſons being preſent as at the preceeding experiment, the following was made on Silver.

Mr. Ruſſel weighed out ſixty grains (one Drachm) of Grain Silver, which he had purchaſed of Meſs^{rs}. Floyer and C^{o}, refiners in Love Lane, Wood Street, Cheapſide: this quantity was placed in a ſmall Crucible on ſome of the flux made as above, before the Company; and on the ſilver, when in fuſion, was projected a bare *half grain* of the Red Powder, uſed in Experiment I. The crucible was then replaced in the fire, and continued there for about a quarter of an hour; a piece of Borax taken at a venture, out of a jar containing a large quantity, was thrown on the metal by Mr. Groſe.

Dr. Price ſoon after, from the appearance of the flux imagining the crucible to be cracked (by the cold and moiſture of the borax) took it out of the fire, and finding that what he ſuſpected had happened, did not replace it; when cool it was broke, and the button of Metal was found in the bottom, which when weighed, appeared not to have loſt any of its original weight, ſo that fortunately only the flux had tranſuded.

EXPERIMENT V.

THAT no doubt might ariſe from the failure of the Crucible in the laſt Experiment, a ſimilar one was made in the preſence of the ſame perſons, with the addition of J. D. Garthwaite of ——— Eſq; who was alſo preſent at the latter part of Experiment IV.

Thirty Grains of the abovementioned Grain Silver was by Mr. Ruſſel weighed out, and put into a ſmall Heſſian Crucible on a flux of Charcoal and Borax made before the company, with the ſame precautions as in Experiment I. On the Silver when fuſed, was projected by Mr. Anderſon a bare *half grain* of the Red Powder, and about five minutes after, ſome Glaſs of Borax (to avoid the moiſture contained in crude Borax) was thrown in by one of the Company. The Crucible after being kept in a red-white heat for about fifteen minutes was taken out, and when cold broke: at the bottom of the ſcoriæ or rather flux, which in this Experiment was neatly fuſed, lay the button of metal which was found *nearly*, *if not exactly*, *of its original weight*.

It was then tried by Mr. Ruſſel in the artiſts' manner; as was alſo the piece of metal obtained in Experiment IV. He found *both* of them to contain gold; the latter in larger quantity, as might be expected, from the relative proportion of the Powder and Silver in the two Experiments.

Dr. Price alſo examined the metal on the touchſtone (Baſaltes) and with Nitrous acid; when all the company ſaw the mark of Gold remaining, while a mark made by a piece of the very parcel of Grain Silver from which the portion uſed in theſe Experiments had been taken, and placed by the ſide of the mark from the enriched Silver, totally vaniſhed on wetting it with the Aqua Fortis.

The mark from the enriched Silver remained (of a yellow colour) after repeated affuſions of weak and ſtrong Aqua Fortis. So that the Company were entirely convinced that Gold was now contained in the fuſed Silver.

The Chemical Reader will probably anticipate the Author's obſervation;—that of the known metallic ſubſtances of a Gold colour, Sulphurated Tin, could not without decompoſition, have ſuſtained the heat employed in theſe Experiments; and that Copper, or Regulus of Nickel, would have been diſſolved by the Nitrous acid, equally with the Silver. The remark is indeed ſcarce neceſſary; for had it been poſſible to have ſecretly introduced into the Crucible any of theſe metals, (and none of the Company would for a moment tolerate the idea of ſuch an attempt having been made) the *identity* of weight obſerved was ſufficient to prove that nothing but the crimſon powder had been added.

After the pieces of metal had been thus ſeparately examined, they were melted together, and when cool it was remarked that the ſurface of the culot of metal was elegantly radiated with alternate ſtriæ and furrows; an appearance not uſual in fuſed Silver. Ten grains were reſerved by Dr. P. for his own examination; and the other 80 grains were taken by Mr. Ruſſel, to be aſſayed in the refiners' manner.

Dr. P. found the proportion of Gold to be $\frac{1}{8}$ of the whole maſs.

Mr. Ruſſel in the courſe of a few days cauſed all the abovementioned Gold, Silver, and mixture of Gold and Silver, to be aſſayed in the artiſts' manner, for the refiners, at the office of Meſsʳˢ Pratt and Dean, Aſſay-Maſters near Cheapſide.

They aſſayed each portion ſeparately, and reported the Gold and Silver to be of the moſt compleat purity: and the enriched Silver to contain Gold in the proportion of one eighth of the joint weight: and this report he alſo repeated before the Spectators of Experim. VII. on May. 25.

It was remarkable that both the Refiner and Aſſay-maſter *at firſt* affirmed the impoſſibility of ſucceſs in the proceſs; and prejudiced by received opinions, queſtioned the purity of the metals, though they owned they *looked* much like ordinary Gold. The aſſay removed their doubts; and they owned with ſurprize, that the metals were entirely pure, and certified their purity in their official report.

EXPE-

EXPERIMENT VI.

Made May 15, 1782, before Sir Philip Horton Clarke, the Rev. B. Anderſon, Capt. Groſe, Dr. Spence, Mr. D. Groſe and Mr. Hallamby, and ſeveral times repeated before Mr. Anderſon, and Dr. Spence.

TWO ounces of Mercury were, by one of the company taken out of a Ciſtern in the Laboratory, containing about two hundred weight of Quickſilver (for experiments on the Gaſſes) and in a ſmall Wedgewood's-ware Mortar rubbed with a drop or two of Vit. Ether: on this Mercury, which was very bright and remarkably fluid, barely a grain of the white powder was put, and afterwards, rubbed up with it for about three minutes.

On pouring the Mercury out of the Mortar, it was obſerved to have become blackiſh and to pour ſluggiſhly; after ſtanding ten minutes, on being poured out of the veſſel in which it had ſtood, it was found conſiderably leſs fluid than before; and in a quarter of an hour's time ſo increaſed in ſpiſſitude as hardly to pour at all; but ſeemed full of lumps. Being now ſtrained through a cloth, a ſubſtance like an amalgam, of a pretty ſolid conſiſtence, remained behind; the unfixed mercury being expelled from this maſs, by placing it on a charcoal and directing the flame of a lamp on it with a blow-pipe, a bead of fine white metal remained fixed in a ſtrong red heat; which by every ſubſequent trial appeared to be Silver: the weight of the bead thus collected, weighed and examined before the company ſeparated, was 18 Grains: but much remaining in the ſtrained Mercury, this was afterwards ſeparated and weighed 11 grains; the whole obtained was therefore 29 grains, or in proportion to the powder as 28 : 1.

Five drachms of Mercury, taken out in the ſame manner as the above two ounces, were rubbed up with Vit. Ether, and afterwards with barely a quarter of a grain of the Red powder; a maſs like an amalgam being obtained by ſtraining it after it had ſtood about a quarter of an hour, and the Mercury driven off before the blow-pipe, as in the former Experiment, a bead of yellow metal remained, weighing 4 grains; and after ſtanding ſome time longer, Gr. 2 and ¼ more were obtained, both which reſiſted Aqua Fortis on the touch-ſtone; and a ſmall quantity being diſſolved in Aqua Regia, a purple precipitate was produced from the Sol. by the Sol. of Tin and a browniſh one by Sol. Ferri Vitriolati, Bergm. (Green Vitriol or Copperas;) in this Experiment therefore the quantity of Gold was to the powder employed, as 24 : 1, excluſive of the weight of the powder.

The former part of this Experiment was repeated on Saturday the 18th day of May, before the Rev. Mr. Manning, the Rev. Mr. Fulham, the Rev. Mr. Anderſon, the Rev. Mr. Robinſon and Dr. Spence.

Two ounces of Mercury, treated as before mentioned, (after exhibiting phænomena ſimilar to thoſe above related) afforded a maſs, one half of which only (to avoid the noxious ſumes of the whole) after having the Mercury expelled from it by a white heat before the blow-pipe, yielded upwards of twelve grains of a white metal, that in every trial to which it was ſubmitted, appeared to be Silver.

The product * therefore including the Silver contained in the ſtrained Mercury would have been nearly as 28 : 1 ; as in the former Experiment.

A ſmall portion (about ʒij) of the above Mercury being put into another veſſel, and about the ſixth of a Grain of the red Powder put on it, the Mercury after being ground up with it, and ſtanding ſome time, was ſtrained as the former, and the ſmall maſs ſo obtained, placed before the blow-pipe. It yielded ſomething more than a grain of Metal, which examined by Nit. acid on the Touchſtone, evidently contained Gold; as was apparent to the Company before their leaving the Laboratory. It was intended to have been ſubmitted to other trials, but from its minuteneſs and form, was accidentally loſt.

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* The Author by the words *product*, *produced* and the like, here and in other places means only to expreſs that a quantity of precious metal was really obtained; and neither to affirm or deny any ſpeculative opinions relative to the mode of action of the matter projected on the Mercury, or concerning the *manner* in which the precious metal is contained in Mercury.

EXPERIMENT VII.

Made Saturday May 25th, 1782, in the preſence of the Lords Onſlow, King and Palmerſton, Sir Robert Barker, Sir Philip H. Clarke, Bart^{t}, The Rev. O. Manning, G. Pollen, B. Anderſon, J. Robinſon, Cl^{ks}; Dr. Spence, W^{m} Mann Godſchall, W^{m} Smith, W. Godſchall, Jun^{r}, Eſq^{rs}—Meſs^{rs} Gregory and Ruſſel.

ʒij Mercury were taken from the Ciſtern formerly mentioned, and in a ſimilar manner, and rubbed up with a few drops of Vit. Ether, in a ſmall mortar, as in Experiment VI.

A bare grain of the white powder was projected, and afterwards rubbed up with it. The Mercury, which before the addition of the powder had been very bright and fluid, was now perceived by the company to be dull and run heavily: it was poured out into a ſmall glaſs veſſel, and after ſtanding for about 45 minutes was put into a cloth to be ſtrained. It now poured ſo ſluggiſhly that the latter portions of it ſeemed in a ſtate intermediate, between fluidity and ſolidity, or to uſe a term leſs ſcientific, but like many other vulgar ones, very deſcriptive, poured grouty.

Great part of the ſuperfluous Mercury being ſtrained off a maſs ſimilar to an amalgam was left in the cloth: and the remaining Mercury which could not be preſſed out, being driven off by fire from a portion (about a fourth) of the whole maſs, a globule of white metal which had all the appearance of Silver, remained, and was kept in a white heat for about two minutes, before the blow pipe.

On the ſame day and before the ſame reſpectable Company:—half an ounce of Mercury revivified from Cinnabar, brought by the Rev. Mr. Anderſon, was by him placed in a ſmall round Engliſh crucible, taken from among a number of others in the Laboratory, by Lord Palmerſton, on a flux compoſed of a ſmall piece of Charcoal and a piece of borax, both taken caſually by ſome of the company from large quantities, and pounded in a mortar previouſly inſpected by thoſe preſent.

This flux being preſſed down in the crucible with a ſmall peſtle, alſo examined, the mercury was poured into the depreſſion, by one of the ſpectators, and on it *half a grain*, bare weight, of the Red Powder, was put by Lord Palmerſton. The crucible being then covered with a lid taken in the ſame manner as the crucible from among many others, and ſhewn round to the company, was placed in the furnace ſurrounded by lighted charcoal.

One or more of the Company, particularly the Lords King and Palmerſton were during the whole time of the Experiment cloſe to the furnace and operator; and as requeſted by him gave the cloſeſt attention to every part of the proceſs.

When the crucible had acquired a full red heat, the cover was removed, and ſeveral of the Company ſaw the Mercury in a tranquil ſtate, neither evaporating nor boiling: in which ſtate it continued even when the Mercury itſelf was completely ignited.

The cover being replaced, the fire was gradually raiſed to a white heat: the crucible being continued in this heat for thirty minutes, was taken out, cooled, and broke.

A globule of Metal was found at bottom, neatly fuſed, and *exactly fitting* the concavity of the divided ſcoriæ. This globule fell out by the blow, among the fragments of the crucible, and was taken up and ſhewn round to the Company by Lord Palmerſton, and in their preſence replaced in the hollow of the vitrified Borax, to which it was accurately adapted.

Many other globules were diffuſed through the ſcoriæ attached to the ſides of the crucible, fragments of which were diſtributed among the company at their requeſt.

The bead which lay at the bottom, weighed about ten grains, and was taken away, together with the Silver, by Mr. Godſchall; and by him afterwards tranſmitted to Lord Palmerſton, to be ſubmitted to proper examination.

Mr. Godſchall returned the Gold, with the Aſſay-Maſter's report on it and on the Silver.

The Aſſay-Maſter, whom Mr. G. for greater certainty on this occaſion had the precaution to have recommended by the Clerk of the Gold-ſmith's company, reported both the Gold and Silver to be perfectly pure.

Dr. Price, though acquainted with the characters employed by Aſſay-Maſters in making their reports (which are peculiar to them) unwilling to rely entirely on his own knowledge, and being deſirous to offer collateral evidence to the public, ſhewed the Gold and the Report to Mr. Lock, an experienced Gold-ſmith of Oxford, without informing him of any of the above particulars.

Mr. Lock affirmed the metal to be *by the Report* Pure Gold: which he added, was confirmed by it's appearance: and that it conſequenly was *ſuperior* to Gold of the Engliſh *ſtandard*.

Two Experiments, ſimilar to thoſe made on Saturday May 25th, were repeated on a larger ſcale, before ſome of the above company on the Tueſday following; with the ſame attention on their part, and more on that of the Author to the regulation of the fire, which he obſerved to them, being now leſs engaged, and his attention not divided, he could employ to produce a much greater effect.

By twelve grains of the White powder were obtained from thirty ounces of Mercury upwards of an ounce and a quarter, or ſix hundred grains of fixed white metal *; or in the proportion of 50 : 1.—And two grains of the Red powder, produced from one ounce of Mercury, two drachms, or 120 grains of fixed and tinged * metal; i. e. ſixty times its own weight.

Theſe laſt portions of Gold and Silver, as well as a part of the produce of the former Experiment, have had the honour of being ſubmitted to the inſpection of his Majeſty; who was pleaſed to expreſs His approbation.

This honour may be mentioned with the leſs impropriety, as it is conferred by a Sovereign equally revered for his patronage of Science and beloved for his amiable condeſcenſion.

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* The words *fixed* and *tinged* are not uſed in conformity to any theoretical notions, but merely to denote the obvious properties of the Metals obtained; and to avoid calling them Gold and Silver without the authority of an aſſay.

THE END.